

**U.S. FISH AND WILDLIFE SERVICE  
SPECIES ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM**

SCIENTIFIC NAME: *Notropis oxyrhynchus* Hubbs and Bonham

COMMON NAME: sharpnose shiner

LEAD REGION: Region 2

INFORMATION CURRENT AS OF: April 15, 2010

**STATUS/ACTION**

☐ Species assessment - determined we do not have sufficient information on file to support a proposal to list the species and, therefore, it was not elevated to Candidate status

☐ New candidate

☒ Continuing candidate

☐ Non-petitioned

☒ Petitioned - Date petition received: May 11, 2004

☐ 90-day positive - FR date:

☐ 12-month warranted but precluded - FR date:

☐ Did the petition request a reclassification of a listed species?

**FOR PETITIONED CANDIDATE SPECIES:**

a. Is listing warranted (if yes, see summary of threats below)? Yes

b. To date, has publication of a proposal to list been precluded by other higher priority listing actions? Yes

c. If the answer to a. and b. is "yes", provide an explanation of why the action is precluded.

Higher priority listing actions, including court-approved settlements, court-ordered statutory deadlines for petition findings and listing determinations, emergency listing determinations, and responses to litigation, continue to preclude the proposed and final listing rules for sharpnose shiner. We continue to monitor sharpnose shiner populations and will change its status or implement an emergency listing if necessary. The "Progress on Revising the Lists" section of the current Candidate Notice of Review (CNOR) provides information on listing actions taken during the last 12 months.

☐ Listing priority change

Former LP: ☐

New LP: ☐

Date when the species first became a Candidate (as currently defined): June 13, 2002

☐ Candidate removal: Former LPN: ☐

- \_\_\_ A – Taxon is more abundant or widespread than previously believed or not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status.
- \_\_\_ U – Taxon not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species.
- \_\_\_ F – Range is no longer a U.S. territory.
- \_\_\_ I – Insufficient information exists on biological vulnerability and threats to support listing.
- \_\_\_ M – Taxon mistakenly included in past notice of review.
- \_\_\_ N – Taxon does not meet the Act’s definition of “species.”
- \_\_\_ X – Taxon believed to be extinct.

ANIMAL/PLANT GROUP AND FAMILY: Fish, Cyprinidae

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE: Texas

CURRENT STATES/COUNTIES/TERRITORIES/COUNTRIES OF OCCURRENCE: Texas

LAND OWNERSHIP: The sharpnose shiner occurs in rivers and streams that are owned by the State of Texas. The majority of the riparian land ownership within the documented range of the shiner is private, with minor areas owned by the State (parks), and Federal (Corps of Engineers) governments. The current population size is not known; however, its range in the Brazos River and major tributaries is approximately 1,010 river miles (mi).

LEAD REGION CONTACT: Sarah Quamme (505) 248-6419

LEAD FIELD OFFICE CONTACT: Arlington, Texas Field Office, Omar Bocanegra, (817) 277-1100

## BIOLOGICAL INFORMATION

Species Description: The sharpnose shiner (*Notropis oxyrhynchus*) is a small, slender minnow, endemic to the Brazos River Basin in Texas (Hubbs *et al.* 1991, p. 21). Adult sharpnose shiners are approximately 30 to 50 millimeters (1.2 to 2.0 inches (in)) in standard length, have a strongly curved ventral contour, oblique mouth, and pointed snout (Hubbs and Bonham 1951, pp. 94-95). They are silver in color, with a faint lateral stripe extending from the gills to the tail. The anal fin is slightly falcate and usually has no more than nine rays; the dorsal fin has eight rays and begins behind the insertion of the pelvic fin (Hubbs and Bonham 1951, p. 95).

Taxonomy: The sharpnose shiner was first collected from the Brazos River in 1938, but was not described until 1951 by Hubbs and Bonham, who speculated that its closest relative was *N. percobromus* (= *atherinoides*), which occurs in the Red River system to the north of the Brazos River drainage and in systems to the east (Gilbert 1980, p. 291). Phylogenetic analysis of the

subgenus *Notropis* also indicates a close relationship between the sharpnose shiner and *N. atherinoides* (Bielawski and Gold 2001, p. 660). A review of the current literature indicates the species is still a valid taxon (e.g., Nelson *et al.* 2004, p. 75; Jelks *et al.* 2008, p. 391).

Habitat/Life History: Sharpnose shiners are obligate riverine fish that occur in fairly shallow water (38 to 82 centimeters (15 to 32 in) in depth) in broad, open sandy channels with moderate current (Moss and Mayes 1993, pp. 21, 37). They generally feed on aquatic invertebrates dominated by dipterans, ostracods, trichopterans, odonata, coleopterans, hemipterans, and various terrestrial arthropods (Marks *et al.* 2001, pp. 330-331). They often consume a large amount of sand/silt, which indicates foraging behavior occurs among the sediment, as well as on drift in the water column (Marks *et al.* 2001, p. 332). Little is known about the life history of this species, although recent evidence suggests spawning may occur continuously from April to September, in addition to periodic batch-spawning events (Durham and Wilde 2009a, p. 25).

The Brazos River watershed extends from eastern New Mexico southeasterly to the Gulf of Mexico. The basin is approximately 1,030 kilometers (km) (640 mi) in length, encompasses approximately 118,103 square km (45,600 square mi) (Dunn and Raines 2001, pp. 3-4), ranges in width from 1.6 to 193 km (1.0 to 120 mi), and drains all or portions of 69 counties in Texas and three counties in New Mexico. The Brazos River originates in the upper reach from the confluence of the Salt and Double Mountain Forks. The upper region of the watershed is highly variable with regard to flow and often becomes intermittent, forming isolated pools within the channel (Echelle *et al.* 1972, pp. 111-112; Ostrand 2000, p. 22).

Historical Range/Distribution: The sharpnose shiner historically occurred throughout the Brazos River system, including the Double Mountain and Salt Forks of the upper Brazos River drainage, and has also been documented in the South and North Forks of the Wichita River within the Red River Basin (Lewis and Dalquest 1957, p. 42; Moss and Mayes 1993, pp. 16, 19-20; Wilde *et al.* 1996, p. 15). Hubbs and Bonham's (1951) description of the sharpnose shiner (82 specimens collected) reported the fish at four sites on the main stem Brazos River (Brazos County), as well as in its tributaries, the Navasota River and Little Brazos River in Brazos County, between 1938 and 1941. An additional collection was made on the Brazos downstream from Towash Creek (Hill/Bosque Counties) in 1940. An introduced population may exist in the Colorado River above Buchanan Reservoir (Hubbs *et al.* 1991, p. 21); however, the validity of this population is still in question (e.g., Moss and Mayes, 1993). A biological study of the upper Brazos River drainage conducted in 1979 estimated a population of 1,611 sharpnose shiners in the Salt Fork, and a population estimated at 451 individuals from Croton Creek, a tributary of the Salt Fork (Johnson *et al.* 1982, p. 14).

Moss and Mayes (1993) conducted an extensive study of the distribution of the sharpnose shiner and smallmouth shiner (*N. buccula*) within the Brazos River system. The study included a review of known museum, university, and other collections (from 1951 to 1986) to determine the historical distribution of both species. Their review indicated the sharpnose shiner historically occurred at 15 main stem sites (not including sites from the original description), three sites on the Double Mountain Fork of the Brazos River, nine sites on the Salt Fork of the Brazos River, and two sites on the Wichita River (from 1953 and 1955), which drains into the Red River Basin.

The historical collections included specimens from the upper, middle, and lower Brazos River systems (Sellers 1996, pp. 27-30), ranging from the upper reaches on the Double Mountain and Salt Forks in Kent County, Texas, to the southernmost site in Fort Bend County, Texas. The Double Mountain Fork collections consisted of 177 specimens from sites in three counties. The Salt Fork collections contained 1,181 specimens from locations in four counties. Upper Brazos River records included 91 specimens collected from four locations in two counties. The remaining historical records consisted of four collections made between 1951 and 1953 from the middle Brazos River and collections made in seven counties in the lower Brazos River prior to 1987.

Current Range/Distribution: Moss and Mayes' (1993) assessment of the declining distribution of the sharpnose shiner within the Brazos River Basin was based on a comparison of historical records with their sampling from October 1988 through August 1991. Of 37 sites sampled, 26 were in the upper Brazos River Basin, including 24 sites upstream of Possum Kingdom Reservoir. From these upstream samples, a total of 2,056 sharpnose shiners were collected at seven sites on the Salt Fork, three sites on the Double Mountain Fork, and three sites on the North Fork Double Mountain Fork. Sharpnose shiners were not found at two sites downstream of Possum Kingdom Reservoir or at collections made from Croton Creek and the Clear Fork of the Brazos River. The sharpnose shiner historically occurred in Croton Creek, but has apparently never been documented from the Clear Fork.

The remaining 11 sampling sites sampled by Moss and Mayes (1993) were located within the middle and lower Brazos River Basin. Only 27 specimens were collected from six sites within the lower Brazos River. Additional sampling was conducted within the Red River Basin on the Wichita River, North Wichita River, and South Wichita River, but no shiners were collected. While the sharpnose shiner may have been native to the Wichita River, it has not been collected since the 1950s and is likely extirpated from that river (Wilde *et al.* 1996, p. 15).

Extensive sampling within the upper Brazos by Ostrand (2000, pp. 13, 34) in 1997 and 1998, produced 2,791 sharpnose shiners at 10 sites, where they represented one of seven dominant species. The population of sharpnose shiners upstream from Possum Kingdom Reservoir is estimated to represent 7.7 percent of the fish assemblage (Ostrand 2000, p.14). Within the upper Brazos region, the sharpnose shiner is common and may have increased in abundance in recent years (Wilde and Durham 2007, p. 69).

Sampling from the lower Brazos River yielded 3 specimens in 2001 (Gelwick and Li 2002) and eight from 2003 - 2004 (Winemiller *et al.* 2004, pp. 24, 47-49). Other sampling efforts in the middle and lower Brazos River have failed to collect sharpnose shiners (Winemiller and Gelwick 1999, Wilde and Bonner, unpublished 2002). Downstream from Possum Kingdom, the sharpnose shiner population is in decline (Bonner and Runyon 2007, p. 16), or may be completely extirpated, and the population within the Wichita River is completely extirpated, representing a reduction of approximately 69 percent of its historical range.

## THREATS

A. The present or threatened destruction, modification, or curtailment of its habitat or range.

Reservoirs. River impoundments adversely affect downstream fisheries by altering temperature regimes, flow rates, substrate, water quality, and nutrient availability (Baxter 1977, pp. 271-274; Anderson *et al.* 1983, p. 81). The downstream effects of impoundments often create homogeneous habitat conditions within the channel, restricting its use to those species that proliferate in deep, incised channels. The significant changes to fish assemblages produced by downstream effects, including the local extinction of species, have been well documented (e.g., Anderson *et al.* 1983, Gore and Bryant 1986). Reservoirs also fragment riverine habitat thereby prohibiting the completion of the life cycle for those species that require an unimpeded stream for spawning and/or migration.

Wilde and Ostrand (1999) studied the effects that creation of the Alan Henry Reservoir on the Double Mountain Fork of the Brazos River had on prairie stream fish. This segment of the Double Mountain Fork is in a semi-arid region (precipitation 46-71 cm per year) where flow is intermittent and dependent on rain events. During the absence of flow, the stream is characterized by isolated pools that provide the only habitat for fish until the next rain event, which may not occur for several months. Following impoundment of the river, the upstream reach showed a dramatic change in the fish assemblage, including a decrease in cyprinids and increase in abundance of cyprinodontids (Wilde and Ostrand 1999, pp. 207-208). This study indicated that at least two fish species have, or will be, extirpated from the upstream reach. The disappearance of the fish is attributed to the lack of reproduction and/or survivorship occurring in isolated pools combined with the inability of the downstream population to recolonize the upstream reach due to the barrier created by the impoundment.

The downstream effects of three major reservoirs, Possum Kingdom, Granbury, and Whitney, have altered the habitat within the Brazos River, impacting the fish assemblage. The Morris Sheppard Dam, which impounds Possum Kingdom Reservoir in the upper Brazos River Basin, releases cold water from the bottom of the reservoir, which has modified the thermal regime up to 120 kilometers (75 mi) downstream. These cold water releases are likely responsible for the extirpation of at least four species of fish in the downstream reach (Anderson *et al.* 1983, pp. 85-86). The two other major reservoirs are located within the middle Brazos River. Granbury Reservoir, approximately 175 km (109 mi) downstream from Possum Kingdom, and Whitney Reservoir, approximately 92 km (57 mi) downstream from Granbury, have also contributed to habitat modification within the middle and lower Brazos River, which is most likely no longer suitable for the sharpnose shiner.

Moss and Mayes (1993) found a distinct difference between the fish assemblage upstream and downstream from Possum Kingdom Reservoir. They suggested that the reservoir has modified downstream habitat, excluding many native prairie minnows while generalist cyprinids have prospered. Anderson *et al.* (1983, p. 86) noted the change created by the construction of the reservoir from sandy bottom and high turbidity (typical sharpnose shiner habitat) to clear, gravel bottom habitat for a distance of 30 km (19 mi) downstream from the Morris Sheppard Dam. Within this reach, seven species not normally found in the non-impacted reaches of the Brazos River (i.e., upstream from the reservoir), including two exotic species, had invaded the modified

channel (Anderson *et al.* 1983, p. 86). Restriction of natural stream flow and sediment transport often contributes to channel incision and narrowing. The transport of sand through the Brazos River system has decreased in part due to reservoirs (Mathewson and Minter 1981, pp. 44-45; Dunn and Raines 2001, pp. 25-26). Mathewson and Minter (1981, p. 46) suggested that the major reservoirs trap approximately 76 percent of all sand produced within the Brazos River Basin.

Future Reservoir Development. Texas recently adopted a new water plan, *Water For Texas 2007*, to address water needs through 2060. Among the water management strategies detailed in the plan, eleven potential new reservoirs and five off-channel reservoirs are listed as feasible for future water supply needs within the Brazos River Basin (BGWPG 2006, pp. 4B.12-1-4, B.12-154, LEWPG 2006, pp. 4-200 – 4-201, RHWPG 2006, p. 4B22-1). Of those, three (Double Mountain Fork, Post, and South Bend Reservoirs) would impound waters that are currently occupied by smallmouth shiners, and the others would affect the species indirectly by influencing water availability, instream flow, and sediment transport within the Brazos River. Double Mountain Fork Reservoir would be located on Double Mountain Fork upstream from the confluence with the Salt Fork; South Bend Reservoir would be located immediately upstream from the confluence of the main stem and the Clear Fork of the Brazos River; Post Reservoir would occur on the North Fork Double Mountain Fork and has been authorized by the Texas Commission on Environmental Quality (TCEQ), with a permit allowing completion by 2012. Of the five potential off-channel reservoirs in the Brazos River Basin, one has obtained water rights on the Navasota River authorizing the diversion of 2,500 acre-feet.

The middle and lower Brazos River has effectively been converted from habitat that once supported the sharpnose shiner to habitat comprised of thermal, physical, and morphological parameters that no longer suitable to the shiner, largely resulting from impoundments within the basin. Although current records from the main stem downstream of Possum Kingdom Reservoir are sparse, remnant populations may still exist in areas of suitable habitat. However, the remaining habitat may be fragmented to the extent that any surviving populations are no longer viable. The continued effects of the existing impoundments coupled with the potential future water management strategies outlined in the Regional Water Plans seriously discount the possibility of recovery of the shiner in the middle and lower Brazos River.

In the upper Brazos River system, sharpnose shiners are most common within higher order streams (Ostrand 2000, p. 21) with suitable flow and conductivity. The flow in the Double Mountain and Salt Forks is commonly intermittent during the summer months and often restricted to large pools within the channel. Under the harsh conditions that accompany non-flow periods, sharpnose shiners are the first species to be eliminated within the pools (Ostrand and Wilde 2001, p. 746). The isolated pools of the upper Brazos tributaries are likely unsuitable for successful reproduction of the sharpnose shiner and other prairie stream fishes (Ostrand and Wilde 2001, pp. 746-747; Durham and Wilde 2006, pp. 1650-1651; Durham and Wilde 2009a, p. 26). Spawning occurs from April to September, but reproductive success is likely greater during periods of high discharge due to increased survival of eggs and young (Durham and Wilde 2009a, pp. 25-26). The shiner's persistence in these upper reaches is most likely the result of recolonization from populations occurring downstream during times of normal flow (Ostrand and

Wilde 2001, p. 747). Reservoir construction on the upper Brazos tributaries (e.g., Post Reservoir and Double Mountain Fork Reservoir) would create a barrier between the base population and the upper reaches, preventing recolonization and potentially reducing reproductive success. Recent population modeling also indicates that reservoir development within the upper Brazos River would substantially reduce stream discharge resulting in a continuous decrease in abundance of the closely related smalleye shiner (Durham and Wilde 2009b, p. 672).

The construction of the John T. Montford Dam, which impounds Alan Henry Reservoir (Garza County), in 1991 resulted in the disappearance of two common fishes within the river's headwaters (Wilde and Ostrand 1999, pp. 208-209). A similar situation could occur on the upper Brazos River and major tributaries should any or all of the Double Mountain Fork, South Bend and Post Reservoir projects be implemented. The potential direct impacts to the shiner resulting from construction of these reservoirs include 1) the inundation of occupied habitat, 2) the local extinction of upstream populations, and 3) the loss of habitat downstream from the dams due to the modification of necessary abiotic components (flow regime, thermal regime, substrate, conductivity, etc.).

Desalination. The streams of the upper Brazos River Basin have natural salts that originate from the salt and gypsum terrain and an underlying brine aquifer in this region. Because the salt entering the Brazos River in this area limits its use as a practical water supply, several studies on the feasibility of salt control have been conducted. Desalination projects include the construction of salt retention reservoirs (e.g., Johnson *et al.* 1982). Recent interests in controlling salt within the upper Brazos region has resulted in the formation of the Salt Fork Water Quality Corporation, which has begun the planning stages of chloride control well fields. The proposed project includes the construction of well fields and associated pipelines within the Croton and Salt Creek watersheds to reduce the seepage from the underlying brine aquifer. Solar evaporation ponds at undetermined locations may also be constructed.

The sharpnose shiner evolved to prosper in the saline and turbid conditions naturally occurring in the Brazos River. Desalination projects proposed for the upper Brazos for the conversion of the natural saline waters to a quality available for human consumption could modify the chemical characteristics conducive to sharpnose shiner habitat. Additionally, those projects that require the construction of brine retention reservoirs may also inundate shiner habitat and reduce instream flows to the major tributaries (e.g., the Salt Fork) as well as the Brazos River proper.

Discharges and Sedimentation. Permits held by domestic (i.e., municipal wastewater) and industrial facilities allow for the discharge of treated and untreated effluent into the basin. In the upper Brazos River drainage alone, the sum of permitted facility discharges is more than 824 million gallons of effluent per day (TCEQ in litt. 2010). These discharges modify water quality and add to the continued alteration of the Brazos River channel, affecting its morphology and substrate composition. Adverse conditions within the channel, such as low dissolved oxygen, result from these discharges and often cause fish kills when sewage facilities fail.

Silt and sediment entering streams via stormwater runoff is a primary source of impairment to surface waters in the United States (USEPA 2002, p. ES-3). The predominant land use within

the Brazos River Basin is agriculture. The practices that accompany agricultural operations, including harvesting, tilling, and native vegetation clearing contribute to sediment entering the Brazos River system and the conversion of the natural substrate to silt and mud bottom. This source, along with other development projects that result in excessive sedimentation within the Brazos River, reduces the available habitat for the sharpnose shiner.

Concentrated animal feeding operations (CAFOs) are abundant within the Brazos River Basin (329 currently permitted (TCEQ, in litt. 2010)). The wastes associated with CAFOs are typically high in nutrients (nitrogen and phosphorus) and historically discharges of these wastes to surface water bodies have resulted in degraded water quality and wildlife mortality (e.g., Baker *et al.* 1998). CAFOs are not permitted to discharge into Waters of the State of Texas, or adjacent to waters of the State, except during chronic and catastrophic rainfall exceeding a 25-year rainfall event in a 24-hour period. During periods of intense rainfall and high flooding, retention structures may fail resulting in catastrophic releases and severe pollution to water bodies, which often results in fish kills. Although discharges from CAFOs are not allowed by permit under normal conditions, unlawful discharges do occur (e.g., pipe breaks and maintenance failures). For example, from 1993 to 1998, the Environmental Protection Agency (EPA), under the Clean Water Act, documented 24 discharges from permitted CAFOs into Waters of the United States in Texas (USFWS 1999, pp. 2-3). Thirteen of these discharges were caused by chronic storm events and reported to the EPA and the remaining eleven were illegal discharges. Additional impacts to surface water quality may occur from groundwater contaminated from past or current management activities or both. Discharges from CAFOs may contain contaminants such as endocrine disrupting and pharmaceutical chemicals that are not currently regulated.

Stormwater discharge and increased sedimentation within the Brazos River resulting from rock mining may have contributed to habitat degradation in the middle Brazos River region. Prompted by numerous complaints from private landowners of excessive sedimentation within a portion of the Brazos River in Palo Pinto and Parker Counties, the TCEQ implemented the Clear Streams Initiative to investigate rock mining facilities and determine levels of compliance with existing regulatory requirements (TCEQ 2004, p. 5). Although TCEQ's September 2004 report concluded that rock mining facilities did not significantly affect the state's streams, numerous operational violations among permitted and un-permitted facilities were documented. Common violations were inadequate Best Management Practices, unauthorized discharges, and failure to monitor as required by the permit (TCEQ 2004, p. 10). The continued operation of un-permitted rock mines and un-enforced mine regulations occurring in the Brazos River Basin may pose a threat to the sharpnose shiner, especially if these facilities occur in the upper Brazos River.

In-stream Gravel Mining. In the lower Brazos River, sand and gravel operations have mined the channel for many years (Dunn and Raines 2001, p. 26). In addition to the obvious short term direct impacts of dredging a river channel for collecting substrate, which may involve draglines, temporary island construction, removal of trees, excavation of settling pits, and heavy machinery within the channel, changes in the aquatic fauna may also occur. Forshage and Carter (1974, p. 699) found major changes in both macroinvertebrate and fish populations resulting from an in-stream gravel operation within the Brazos River. In the absence of careful planning and appropriate mitigation measures, in-stream mining could also result in long term irreversible

effects to the stream (Langer 2002, p. 6). We do not have information on the significance of the effects of these operations to the sharpnose shiner.

B. Overutilization for commercial, recreational, scientific, or educational purposes.

We are not aware of any information regarding overutilization of the sharpnose shiner for commercial, recreational, scientific, or educational purposes. Minnows of the genus *Notropis* are used as bait fishes and are harvested in the commercial bait industry. Commercial bait harvesters are required to obtain a permit and report annually on the species and numbers collected. However, the permit does not restrict the quantity of nongame fish that can be harvested, and furthermore, does not require reporting of *Notropis* spp. beyond the genus level. In 2002, four permits were issued for the harvest and sale of minnows from the Brazos River. Only two permittees reported a harvest in 2001. Currently, there are no active permits for minnow harvest from the Brazos River. The impacts the bait industry may have on the sharpnose shiner are unknown.

C. Disease or predation. We are not aware of any information regarding disease or predation on the sharpnose shiner. The State introduces game fish within the Brazos River and its impoundments, including some exotic species, which likely prey on sharpnose shiners. However, the extent of the effects of predation has not been determined.

D. The inadequacy of existing regulatory mechanisms. State law does not provide protection for the sharpnose shiner. There are no regulatory mechanisms for persons harvesting these minnows for use as bait fish, with the exception of a State fishing license and Nongame Fish Permit. Permitted individuals are not restricted in quantity for bait fish harvests. See also discussion under Section B.

E. Other natural or manmade factors affecting its continued existence. The upper Brazos River region (upstream of Possum Kingdom Reservoir) is affected by the invasive exotic saltcedar (*Tamarix* sp.). Saltcedar was introduced in the United States from Eurasia as an ornamental plant in the late eighteenth century and has since escaped from cultivation and spread rapidly throughout the southwestern United States (Robinson 1965, p. A3). The rapid spread of saltcedar is likely an indirect result of reservoir construction and modification of natural river flows (Kerpez and Smith 1987, p. 3). The effects of saltcedar invasion on native ecosystems include alteration of stream and groundwater hydrology, displacement of native plant communities, and degradation of wildlife habitat (Kerpez and Smith 1987, pp. 3-5). As of 1969, saltcedar was the most extensive flood plain community in the upper Brazos River from Possum Kingdom Reservoir to the confluence of the Salt and Double Mountain Forks (approximately 521 river km (324 river mi)), covering approximately 28 percent of the flood plain (Busby and Schuster 1971, pp. 285-286). Blackburn *et al.* (1982, p. 299) estimated saltcedar occupied 57 percent of the original Brazos River channel from the confluence of the main stem and Clear Fork upstream to Seymour, Texas (129 river km (80 river mi)). The establishment of saltcedar in this region has slowed flood water velocity which has resulted in excessive sediment deposition and narrowing of the channel (Blackburn *et al.* 1982, p. 300). The average width of this stretch of the river has narrowed from 157 meters(m) (515 ft) in 1941 to 67 m (220 ft) in 1979 (Blackburn *et al.* 1982, p. 299).

The invasion of saltcedar within the upper Brazos region that has resulted in modification of the channel, excessive sediment deposition, and altered flood stages is a threat to the sharpnose shiner. The sharpnose shiner requires fairly shallow, broad, open sandy channels with moderate current. The effects of dense saltcedar communities along the main stem, Double Mountain and Salt Forks over time may render them unsuitable to sharpnose shiners. The magnitude of this threat is unknown and dependent on the extent and rate of saltcedar encroachment within the entire upper Brazos River and its major tributaries. However, because the infestation occurs within the portion of the river supporting the majority of the known shiners, the threat may be significant.

In recent years, the Brazos River has experienced massive blooms of golden algae (*Prymnesium parvum*) resulting in several fish kills. The alga releases toxins into the water that have a lethal effect on gill-breathing animals. Although little is known about the causes of golden algal blooms, as with many other algae, they may be triggered by excessive nutrient loading from point and non-point sources such as industrial and municipal discharges and runoff from agricultural operations. We are not aware of any information indicating that the threat from algal blooms is significant to the sharpnose shiner.

The limited distribution of the sharpnose shiner in the upper Brazos River Basin makes it vulnerable to catastrophic events occurring in the region. The shiner may recover from droughts, provided the conditions of its habitat remain suitable. Catastrophic events such as the introduction of competitive species or prolonged drought would increase the likelihood of extinction.

The potential for unintentional introduction of competitive species by anglers and commercial bait fishermen is high. For example, the Red River shiner (*N. bairdi*) was apparently introduced into the range of the threatened Arkansas River shiner, and may seriously threaten its status. The Red River shiner is currently not known from the Brazos River; however, the probability of introduction is high, since the Red River Basin is immediately to the north of the current population of sharpnose shiners. Currently, there is no evidence that introduced species in the Brazos River effectively compete with the sharpnose shiner.

CONSERVATION MEASURES PLANNED OR IMPLEMENTED: None.

#### SUMMARY OF THREATS:

The primary threat to the sharpnose shiner is habitat loss and modification due to current and future reservoir development. Reservoir development within the Brazos River Basin is largely responsible for the modification of habitat in the river that has rendered major portions unsuitable for the sharpnose shiner. The three major impoundments of the Brazos River proper have apparently extirpated the sharpnose shiner from the middle Brazos region and reduced it to relict populations within the lower portion of the river. Proposed reservoir development in the upper Brazos region is a significant threat to the extant populations. While only one reservoir is currently permitted (Post Reservoir) in the upper Brazos region, others are included in the Texas

State Water Plan as a potential source to meet the demand for water through the year 2060.

Additional substantial threats to the sharpnose shiner are in-stream sand and gravel mining, industrial and municipal discharges, CAFOs, desalination, excessive sedimentation, and the spread of invasive saltcedar. The effect of saltcedar within the upper Brazos region threatens the existing sharpnose shiner habitat. Saltcedar encroachment in the upper Brazos and tributaries is likely an indirect result of impoundment of the river. Desalination is a potential future threat in the upper Brazos River Basin. In-stream sand and gravel mining, excessive sedimentation, and industrial and municipal discharges coupled with the effect of impoundments, reduce the likelihood of the Brazos River sustaining viable populations of the sharpnose shiner downstream of Possum Kingdom Reservoir. These threats combined with the substantial reduction in historic range due to anthropogenic factors justify the candidate status of the sharpnose shiner.

We find that the sharpnose shiner is warranted for listing throughout all of its range, and, therefore, find that it is unnecessary to analyze whether it is threatened or endangered in a significant portion of its range.

For species that are being removed from candidate status:

\_\_\_ Is the removal based in whole or in part on one or more individual conservation efforts that you determined met the standards in the Policy for Evaluation of Conservation Efforts When Making Listing Decisions (PECE)?

#### RECOMMENDED CONSERVATION MEASURES:

The Service recommends continued monitoring of the species habitat conditions, and threats within its range. Research is needed to understand the requirements of the extant population for maintaining its current range. A concerted effort to develop and identify alternatives to reservoir development and desalination in the upper Brazos River should be a high priority for conservation of the species. Additionally, more information is needed regarding the threat posed by invasive saltcedar and potential strategies for restoration of areas in the upper Brazos River impacted by saltcedar.

#### LISTING PRIORITY

THREAT			
Magnitude	Immediacy	Taxonomy	Priority
<b>High</b>	Imminent	Monotypic genus	1
		Species	2
		Subspecies/population	3
	<b>Non-imminent</b>	Monotypic genus	4
		<b>Species</b>	<b>5*</b>
		Subspecies/population	6

Moderate to Low	Imminent	Monotypic genus	7
		Species	8
		Subspecies/population	9
	Non-imminent	Monotypic genus	10
		Species	11
		Subspecies/population	12

Rationale for listing priority number:

*Magnitude:* The reduction in the historical distribution of the sharpnose shiner in the Brazos River Drainage is largely attributable to the continued modification of its habitat. The existing modifications to the river may limit the survival of any remaining populations and preclude the recovery of the shiner within the middle and lower Brazos River. The primary threat to the remaining stable population in the upper Brazos region is the documented direct and indirect impacts of potential reservoir development in the basin. Currently, one reservoir is authorized within the current range of the species. Several additional potential water development projects, including major reservoir sites, and desalination are options for meeting the future water demand in this region. For these reasons, we believe the magnitude of threat to the species is high.

*Imminence:* The potential water development projects in the upper Brazos River basin, with the exception of the permitted Post Reservoir, are options for meeting the water needs in the region to the year 2060 or beyond. Large reservoir development is usually a lengthy process that may extend for several years depending on funding, land acquisition, and local opposition. However, the potential for low-priority water projects to be elevated to high priority during subsequent planning cycles exists. At this time, we consider the immediacy of threats to the species is best categorized as non-imminent.

Yes Have you promptly reviewed all of the information received regarding the species for the purpose of determining whether emergency listing is needed?

Is Emergency Listing Warranted? No. Stable populations of the sharpnose shiner currently exist in unmodified portions of its range.

#### DESCRIPTION OF MONITORING:

Monitoring the status of the sharpnose shiner currently consists of contact with local fisheries biologists (academic researchers and State biologists) who have expertise with the species. A literature search was performed using two or more abstract databases, as well as the internet, to locate newly published articles related to the species and the Brazos River. In 2008, the Texas Parks and Wildlife Department (TPWD) funded a five year study on the reproductive ecology and population dynamics of five upper Brazos River fish species, including the sharpnose shiner. When completed, this study should provide information important for the management and

conservation of the species. This minimal level of monitoring is sufficient to update the status of the species due to the species' endemism to the state and the presence of experts employed with the state agency and local universities.

## COORDINATION WITH STATES

The Service biologists in Texas regularly work with their counterparts in the TPWD, the State agency responsible for conservation of Texas' fish and wildlife resources, in coordinating conservation and information on candidate species. The Service contacted TPWD by letter dated March 4, 2010, requesting any new information on candidate species in Texas. TPWD provided a written response dated March 30, 2010, which indicated no new information was available for this species. The state wildlife action plan, Texas Comprehensive Wildlife Conservation Strategy 2005-2010, lists the sharpnose shiner as a priority species in the Brazos River Basin.

Indicate which State(s) did not provide any information or comments: N/A

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APPROVAL/CONCURRENCE: Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes, including elevations or removals from candidate status and listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all resubmitted 12-month petition findings, additions or removal of species from candidate status, and listing priority changes.

Approve:  May 21, 2010  
Acting Regional Director, Fish and Wildlife Service Date

Concur:   
ACTING :  
Director, Fish and Wildlife Service Date: October 22, 2010

Do not concur: \_\_\_\_\_  
Director, Fish and Wildlife Service Date

Director's Remarks:

Date of annual review: April 15, 2010  
Conducted by: Omar Bocanegra